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planetary image to be slightly elongated as compared with the perfectly round images of the adjacent stars. With the same instrument a minute disk about 3" in diameter is discernible visually. No central star is seen. A rough estimate of the visual magnitude of the nebula as a whole is about 11.5.

M. L. HUMASON.

### GENERAL NOTES

*A Very Massive Star*:—Under this title Dr. J. S. Plaskett, Director of the Dominion Astrophysical Observatory, Victoria, B. C., presented at the meeting of the Royal Astronomical Society of London on June 9, a paper giving the results of his researches upon the star B. D. + 6°.1309 (R. A. 6<sup>h</sup>32.0<sup>m</sup>; Decl. + 6°13'). The star is one of a number which had been placed upon a special program of radial velocity observations about a year ago because they gave promise of adding to our knowledge of the masses of stars of very early spectral type (Oe to Oe5). It was not known to be a spectroscopic binary at that time but the very first spectrogram, secured on December 16, 1921, showed a doubling of the lines (of type about Oe5) with large displacement—conclusive evidence of the presence of two bodies in the system. Special attention was therefore given to the star and 30 spectrograms were obtained as promptly as possible and measured to determine the orbit. The results are of exceptional interest.

The period proves to be 14.414 days, and from this and the other orbital data the following values of the distance between the centers of the two components and of their masses were derived:

$$\begin{aligned}(a_1 + a_2) \sin i &= 89,750,000 \text{ km} = 129 \text{ times the radius of our Sun.} \\ m_1 \sin^3 i &= 75.6 \text{ times the mass of the Sun.} \\ m_2 \sin^3 i &= 63.3 \text{ times the mass of the Sun.} \\ (m_1 + m_2) \sin^3 i &= 138.9 \text{ times the mass of the Sun.}\end{aligned}$$

These results rest directly upon the spectrographic measures and involve no assumption except the applicability of the law of gravitation to binary star systems. They express, however,

MAGNETIC CLASSIFICATION OF SUN-SPOTS FOR JULY, 1922

No.	C. M. P.	Lat.	H	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1978	July 6.2	+9	6															
1979	10.3	-9	20				$\beta$	$\beta f$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$					
1980	12.2	+11	14					$x$	$\alpha p$	$\alpha p$	$\beta$	$\beta$	$\beta p$	$\alpha$	$\alpha$			
							1	2	2	3	3	3	2	1	1	0	0	0

No.	C. M. P.	Lat.	H	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1981	July 22.7	-7	30																
1982	23.7	-15	1			$x$	$\beta f$	$\beta \gamma$	$\beta p$	$\beta p$	$\beta p$	$\beta p$	$\beta p$	$\beta p$	$\alpha p$	$x$			
1983	24.9	-7	5							$x$	$\beta \delta$	$\beta$							
										2	2	2	1	1	1	1	0	0	-

MAGNETIC CLASSIFICATION OF SUN-SPOTS FOR AUGUST, 1922

No.	C. M. P.	Lat.	H	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1984	Aug. 8.1	+10	11		<i>x</i>	<i>ap</i>	<i>ap</i>	<i>ap</i>	<i>x</i>									
1985	6.3	-11	5															
				0	1	1	1	2	1	0	0	0	0	0	0	0	0	0

No.	C. M. P.	Lat.	H	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1986	Aug. 22.4	-13	17									<i>ap</i>	<i>ap</i>	<i>ap</i>	<i>ap</i>	<i>x</i>			
1987	25.5	+4	20								<i>x</i>	<i>ap</i>	<i>ap</i>	<i>ap</i>	<i>ap</i>	<i>ap</i>	<i>ap</i>	<i>ap</i>	<i>x</i>
				0	0	0	0	0	0	0	1	1	1	1	2	2	1	1	1

NOTES

No. 1979 Return of No. 1973. On July 7 an invisible spot with a negative magnetic field of 200 gaussess closely followed the visible spot, which was also negative.

No. 1981 On July 20 some small spots, which were irregular with regard to the distribution of polarities, followed the main group. These were responsible for the classification  $\beta\gamma$  on that day. This was the largest group since No. 1967, which crossed the central meridian on May 2.

only the limiting minimum values of the masses and of the radius of the system because the left-hand members of the equations carry the factor  $\sin i$  or  $\sin^3 i$ . It is well known that spectrographic observations alone do not suffice to determine separately the values of  $i$  (the inclination of the orbit plane) and  $a$  (the major semi-axis of the orbit), but only the function  $a \sin i$ . If the inclination were  $90^\circ$ ,  $\sin i$  would equal unity and the equations would give the actual masses and radius. But in this event the star should be a variable star of the type of Algol, for each component would eclipse the other once in every revolution. Since no variation in brightness has been observed, it is safe to say that no eclipse occurs; and from this fact and other considerations Dr. Plaskett estimates the inclination to be not greater than  $73^\circ$ . If he is correct the minimum masses must be increased by about 14%, giving a mass for the system of nearly 160 times that of our Sun. This is four times as great as that of any other known stellar system.

On the basis of the researches of other astronomers upon the surface brightness and density of stars of this spectral type, Dr. Plaskett estimates the density of these stars to be 0.01 that of the Sun and the absolute magnitude of the brighter component as  $-5.65$ . Since the apparent (visual) magnitude is only  $+6.71$ , the parallax is only  $0''.00035$  which corresponds to a distance of about 10,000 light-years. The diameter of the larger component would then be 20 times that of the Sun and its brightness more than 10,000 times the brightness of the Sun. The smaller component would be but little smaller and fainter. These values, while probably of the right order, do not have the certainty which attaches to those of the masses.

For other interesting points the reader is referred to the original paper which is printed in the June number of the *Monthly Notices, R. A. S.*

R. G. A.

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*Watchers of the Sky.* By Alfred Noyes.<sup>1</sup>—This book may be recommended with confidence to all who are interested in astronomy. Although the theme had been in Mr. Noyes's mind

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<sup>1</sup>American edition published by Frederick S. Stokes Company, New York. Price \$2.50.

for years, the book had its actual inception in a visit to the Mount Wilson Observatory on the night when the great 100-inch reflector was first used, and, in the seven sections between prologue and epilogue, it treats of the progress of astronomical discovery as exemplified by Copernicus, Tycho Brahe, Kepler, Galileo, Newton and Sir William and Sir John Herschel. It is to be the first volume of a trilogy treating of scientific discovery under the general title of *The Torch-Bearers* (the title given to the present volume in the edition printed in England), and its central thought is that every great discoverer feels it his mission to keep alight the torch of knowledge, carry it a little farther into the darkness of the unknown, and pass it on to his successor. "An end," says Tycho Brahe,

"Comes to us all through blindness, age or death.  
If mine must come in exile, it shall find me  
Bearing the torch as far as I can bear it,  
Until I fall at the feet of the young runner,  
Who takes it from me, and carries it out of sight,  
Into the great new age I shall not know,  
Into the great new realms I must not tread."

Incidentally, interesting side-lights are thrown upon the lives of these great astronomers, and in particular, upon the life of Galileo.

As to the poetic merits of the book opinions differ widely. It has been extravagantly praised and sharply criticised. In my own reading of it I have found it of unequal quality. Certainly it is not "great epic poetry," but it is also very far from being mere "poetic sauce poured over a great theme." Like nearly all of Mr. Noyes's verse, the lines are smooth and flowing and stand well the rather searching test of being read aloud. While it must be confessed that many passages are simply prose cut to blank verse length, many others are beautiful verse and some bear the unmistakable hall-mark of true poetry. Two memory-haunting little lyrics introduced into the section "Sir John Herschel Remembers" are perhaps as fine as anything in the book:

## THE EARTH

Was it a dream, that, in those bright dominions  
 Are other worlds that sing, with lives like mine,  
 Lives that with beating hearts and broken pinions,  
 Aspire and fall, half-mortal, half-divine?

A grain of dust among those glittering legions—  
 Am I, I only, touched with joy and tears?  
 O, silver sisters, from your azure regions,  
 Breathe, once again, your music of the spheres;—

## THE SUN

I hear their song. They wheel around my burning!  
 I know their orbits; but what part have I?  
 I, that with all those worlds around me turning,  
 Sail, every hour, ten thousand leagues of sky?

My planets, these live embers of my passion,  
 And I, too, filled with music and with flame,  
 Flung thro' the night, for midnight to refashion,  
 Praise and forget the splendor whence we came.

R. G. A.

*The Orbit of Sirius.*—The leading article in *Popular Astronomy* for August-September, 1922, is "The Orbit of Sirius," by Charles P. Howard. Mr. Howard has used the graphical method which he described in *Astronomy and Astrophysics*, June, 1894, and the results show its merits when used by a skilful and painstaking draftsman who is also a good computer. He based his work directly upon the measures themselves, disregarding existing orbits, and corrected his apparent ellipse no less than twenty-seven times before he was satisfied that he had secured the best possible representation of the observations.

I have compared his elements with those derived by M. Robert Jonckheere and with my own set. All three of us used substantially the same data of observation but entirely different methods of computation. Mr. Howard's elements differ from the two earlier sets, which are practically identical,<sup>1</sup> by but very

<sup>1</sup>See these *Publications*, October, 1918, p. 311.

small quantities. Whether or not these represent an improvement it will be impossible to say until we have measured the system for another decade or two, for the companion is still near its greatest apparent distance from *Sirius* and is changing its position but slowly.

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R. G. A.

*The Binary Stars.* By *R. G. Aitken*.—Several persons have recently complained that they have found difficulty in obtaining this book through their book-sellers. This is doubtless due to the fact that the publishers, the Arbor Press, went into receivership in 1921. The plant was later sold at receiver's sale and at that time the stock of *The Binary Stars* was purchased by the Condé Nast Press, 19 West Forty-fourth Street, New York, who will fill promptly any orders sent to them.

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*The Adolfo Stahl Lectures in Astronomy.*—This book is now out of print, the last copies having been sold by the Secretary of the Society early in the present year. Orders are still being received regularly but under present conditions it is impossible to undertake the issue of a second edition.

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*The Summer Meeting of the American Astronomical Society* was held at the Yerkes Observatory, on September 5-8, 1922. The preliminary program carries a list of 63 papers, enough, surely, for the six half-day sessions scheduled, even though the maximum time allowance for any one paper is set at ten minutes. At this time the only news that has come to us from the meeting, beyond the fact that it was a successful one, with about fifty members in attendance, is the very satisfactory item that the council elected to honorary membership in the Society, Professor Herbert Hall Turner, Savilian Professor of Astronomy at Oxford University. Complete minutes, with abstracts of papers will, as usual, be printed in *Popular Astronomy*. Dr. Frank Schlesinger retires from the Presidency, in accordance with the statutes, having held the office for three years. Dr. W. W. Campbell has been elected as his successor.